

When Did China's Economic Growth Start to Slow Down? A New Method of Tracking China's Per Capita GDP Trends and Cycles

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Motivation & Research Questions

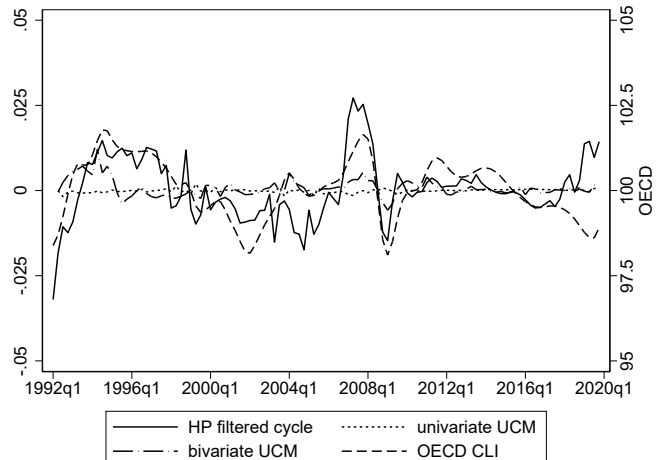
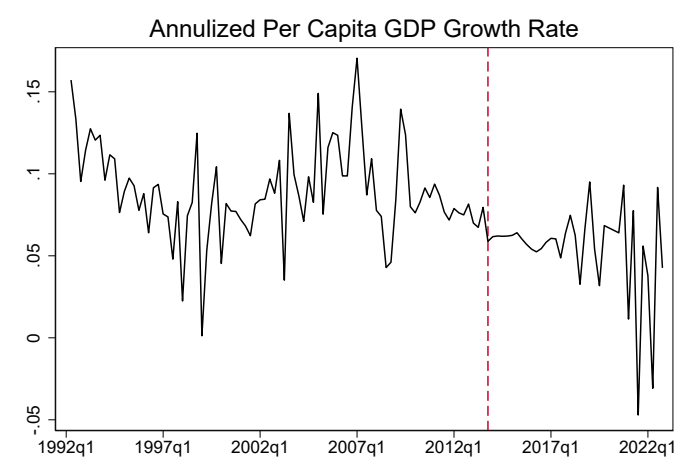


Figure 1. Annualized Per Capita GDP Growth Rate

Figure 2. Cycles Using Existing Approaches

- When Does China's Economy Start to Slow Down?
 - Is the recent slowdown due to a trend slowdown or a business cycle trough?
- How to measure China's per capita trends and cycles?
 - Using the existing approaches, China has no business cycles.

Consumption-based Method

- Trend is driven by permanent shocks, while Cycle is driven by transitory shocks.
- The GDP per capita trends can be measured by consumption based on two corollaries of the PIH.
- Permanent Income Hypothesis by Friedman (1957)
 - Consumers respond to changes in permanent income but largely ignore changes in transitory income.
- Two corollaries
 - Consumption follows a random walk (Hall(1978))
 - Consumption and income are cointegrated (King et al.(1991))
 - Equivalent to C/Y ratio is stationary.

Econometric Specification

- Consumption follows a random walk:

$$c_t = \delta + c_{t-1} + \varepsilon_t \quad (1)$$

- Consumption and income are cointegrated:

$$y_t = \gamma + c_t + \mu_t \quad (2)$$

- Trend-Cycle Decomposition:

$$y_t = y_t^T + y_t^C \quad (3)$$

Trend y_t^T : random walk; Cycle y_t^C : $I(0)$

- ⇒ Decomposition based on PIH

$$\text{Trend: } y_t^T = \gamma + c_t \quad (4)$$

$$\text{Cycle: } y_t^C = \mu_t \quad (5)$$

Data

- Dataset: Chang, Chen, Waggoner and Zha. (2016, NBER Macro)
- Data source: Federal Reserve Bank of Atlanta
- Sample period: 1992Q1 to 2022Q4

- Random walk test: Hall (1978)
- Cointegration tests: ADF for C/Y ratio, Engle-Granger, Johansen.

Preliminary Evidence of Relatively Stable C/Y Ratio

- The declined nominal C/Y ratio is a price matter.
- CPI increases slower than GDP deflator

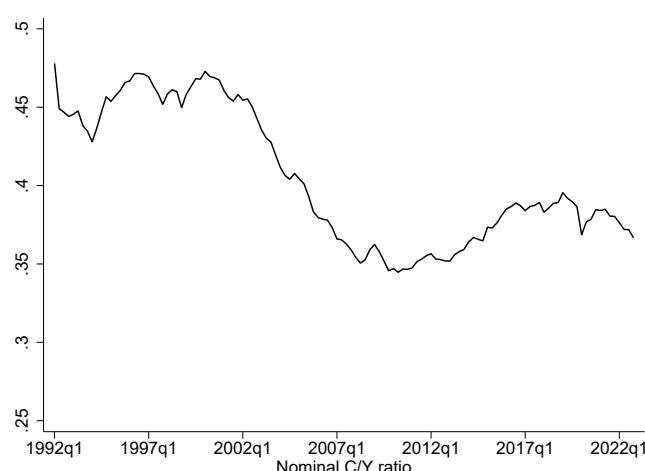


Figure 3. Nominal C/Y ratio

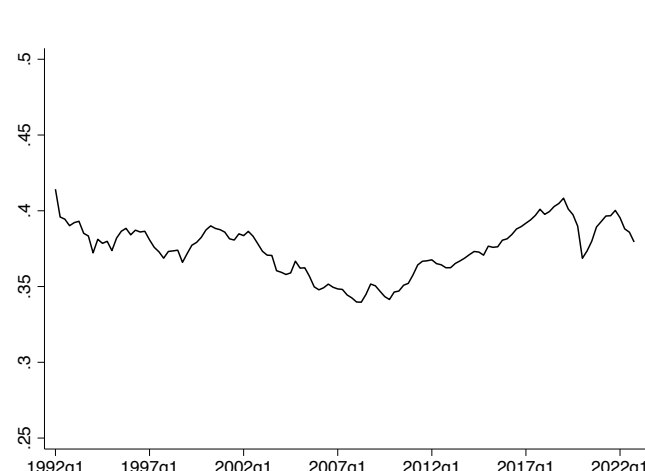


Figure 4. Real C/Y ratio

Estimated Trends and Cycles

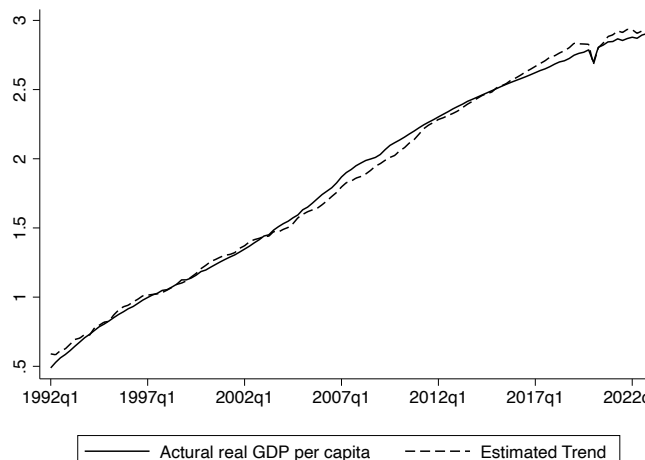


Figure 5. Actual and Trends

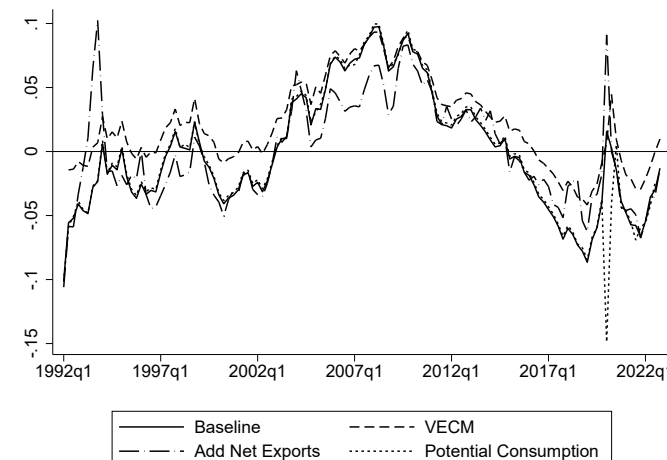
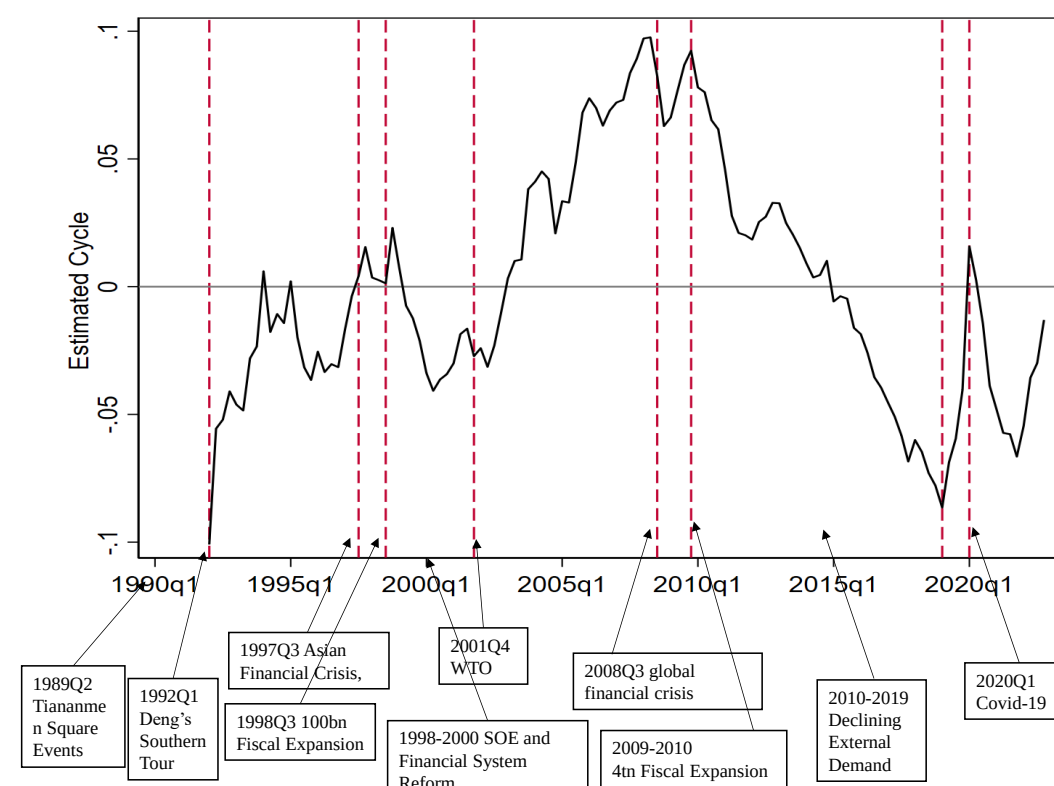


Figure 6. Cycles

Link Cycles to Major Events



Potential GDP Per Capita Growth

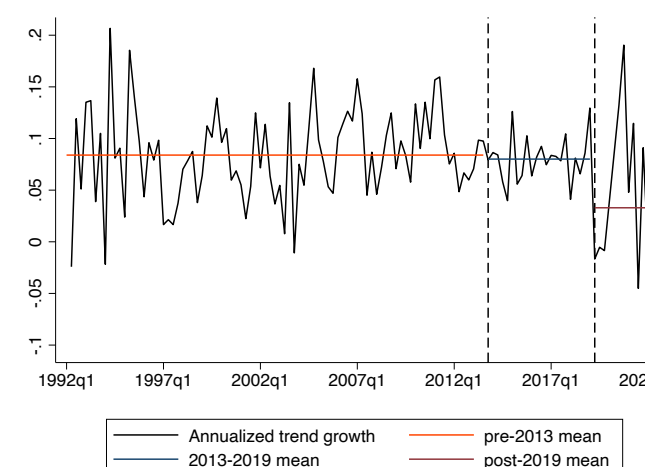


Figure 7. Potential GDP per capita Growth

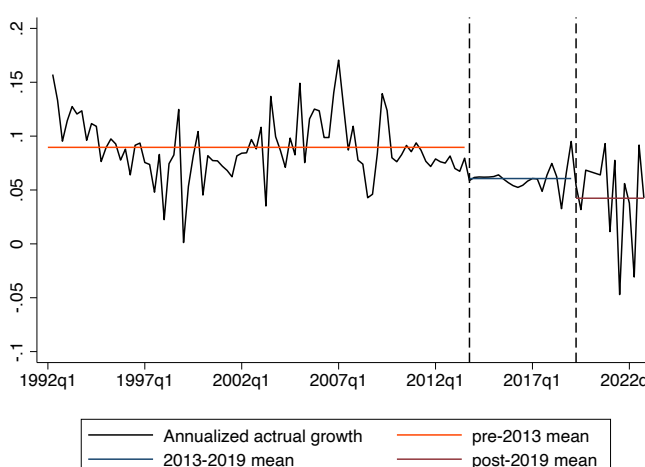


Figure 8. Actual GDP per capita Growth

- The decline in actual GDP per capita growth from 2013 to 2019: a cyclical recession; after 2019: trend decline.

Cycles and External Demand Over 2002-2019

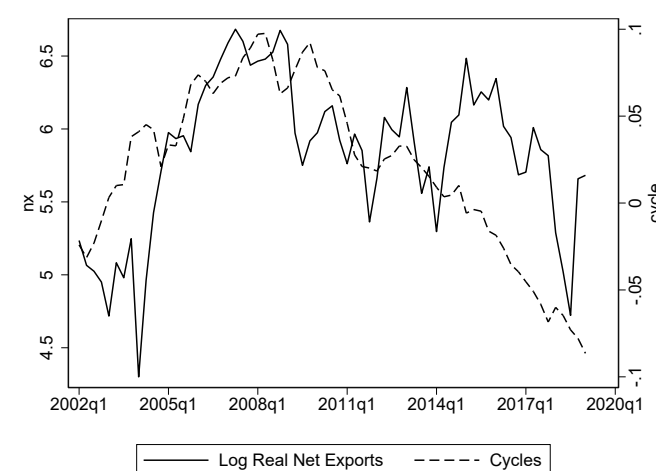


Figure 9. log real NX and cycles

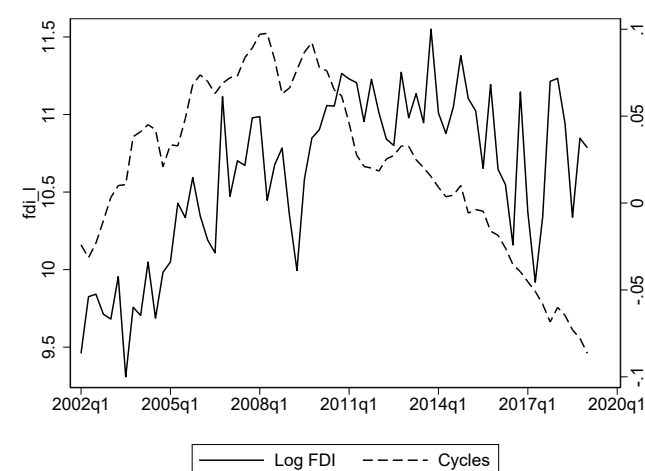


Figure 10. log FDI and cycles

Conclusion

- Consumption can measure the GDP per capita trend based on PIH.
- The slowdown in actual GDP per capita growth from 2013 to 2019 was cyclical
- The prolonged cycle from 2002 to 2019 driven by external demand.
- We evaluate the output gap estimates based on their ability to predict future inflation, their consistency under data revisions, and their response to transitory versus permanent shocks.